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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/542,618

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Megumu Nagasawa

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09/21/2009

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EXAMINER

CREPEAU, JONATHAN

ART UNIT

PAPER NUMBER

1795

MAIL DATE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/542,618	<b>Applicant(s)</b> NAGASAWA ET AL.	
	<b>Examiner</b> Jonathan Crepeau	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 10-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 10-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office action addresses claims 1 and newly added claims 10-13. Claims 1, 10, and 11 are rejected for substantially the reasons of record over WO '215, and claims 12 and 13 are newly rejected under 35 USC 103 as necessitated by amendment. Accordingly, this action is made final.

### ***Claim Rejections - 35 USC § 103***

2. Claims 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/43215. Abe et al (U.S. Pre-Grant Publication No. 2003/0113611) is taken as an English equivalent of WO '215 herein.

Abe et al. '611 teach a fuel cell comprising electrodes and a proton exchange electrolyte membrane. In [0031] and [0032], the reference discloses that the electrodes each comprise an electroconductive porous substrate, an inorganic catalyst, polyaniline doped with a polymer sulfonic acid (proton acid), and a proton exchangeable resin. The inorganic catalyst can be platinum (see [0065]). Regarding claim 10, the polymer sulfonic acid can be phenolsulfonic acid novolac resin (see [0013]). Regarding claim 1, CO may be supplied to the anode with hydrogen (see [0007]).

Abe et al. do not teach that the polymeric acid (dopant) has an ion exchange capacity of 1.6 mg/eq or more, as recited in claim 1.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use a sulfonic acid polymer with a high proton conductivity in the electrodes of Abe et al. It has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). In this case, the use of a polymer having a high ion-exchange capacity would have more active proton sites available for the electrode oxidation-reduction reactions, as discussed in [0014] of Abe et al.

3. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO '215 as applied to claims 1 and 10 above, and further in view of Fuglevand et al (U.S. Patent 6,218,035).

Abe et al. does not expressly teach that the proton acid polymer is crosslinked, as recited in claims 11 and 12.

In column 10, line 11, Fuglevand et al. teach a fuel cell comprising a crosslinked copolymer comprising sulfonic acid groups in the anode and cathode electrodes.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because a particular known technique (crosslinking ionically conductive polymers in electrodes) was recognized as part of the ordinary capabilities of one skilled in the art. Furthermore, crosslinking provides predictable results including

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increased strength. As such, it would have been obvious to crosslink the proton acid polymer of Abe et al.

4. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO '215 in view of Fuglevand et al. as applied to claims 11 and 12 above, and further in view of Motogami et al (U.S. Patent 5,116,541).

WO '215 and Fuglevand et al. do not expressly teach the novolac resin is crosslinked with polyisocyanate, as recited in claim 13.

Motogami et al. is directed to an ion-conductive polymer electrolyte which may contain a crosslinking agent such as an isocyanate compound (see abstract). In column 3, line 61 et seq., the reference teaches that the compound may be a polyisocyanate.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use a polyisocyanate as the crosslinking agent of WO '215 as modified by Fuglevand et al. In column 4, line 67, Motogami et al. teach that "[w]hen an active hydrogen compound is crosslinked with a crosslinking agent such as polyisocyanate and the like, a film superior in both of curability and adhesion to the electrode can be obtained." Accordingly, the artisan would be motivated to use a polyisocyanate as the crosslinking agent of WO '215 as modified by Fuglevand et al.

***Response to Arguments***

5. Applicant's arguments filed May 26, 2009 have been fully considered but they are not persuasive. Applicants state that "Abe '611 does not disclose or suggest that the anode carries an ionic polymer sulfonic acid or a polymeric acid alone without the organic polymer." However, this argument is not persuasive because the present claims do not exclude such an organic polymer (i.e., polyaniline) from being present. In fact, claim 1 recites an additional "proton-conductive ion exchange electrolytic polymer" present in the anode, although this is deemed to correspond to a different component in the Abe '611 anode. Applicants further state that "when the ionic polymer sulfonic acid of Abe '611 is used as a dopant for an organic polymer such as polyaniline, and forms a salt together with the polyaniline, the ionic polymer sulfonic acid can not provide any protons with a catalyst layer, in particular, in the neighborhood of noble metal particulate electrode catalyst," and accordingly, the polymer sulfonic acid acting as a dopant "has no function of a protonic acid." This argument is also not persuasive because the Applicant's assertion that the acid essentially loses its identity and forms a salt is not supported by the reference. The polymer sulfonic acid, although it is a "dopant," appears to retain its acidic character and is capable of supplying protons. See [0026], which expressly discloses a "powder of electroconductive polyaniline containing the polymer sulfonic acid as a dopant." Accordingly, the rejections as stated above are believed to be proper.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (571) 272-1292. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795  
September 19, 2009